REMARKS

The Amendments

The specification is amended to incorporate the language of original claim 4 into the body of the specification. The amendment is not new matter because original claim 4 is part of the original disclosure.

The claims are replaced with new claims at least in part to distinguish the cited art. The claims are fully supported by the disclosure. Regarding claim 11, it is not literally supported by the disclosure. But it is supported since it recites a range which is encompassed by the literally recited range. See In re Voss, 194 USPQ 267, 271 (CCPA 1977).

To the extent that the amendments avoid the prior art or for other reasons related to patentability, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art or otherwise unpatentable to applicants. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

The Objection to the Specification

The objection to the specification is believed to be rendered moot by the above amendment.

The Rejections under 35 U.S.C. § 102 and § 103

The rejections of claims 1 and 3 under 35 U.S.C. § 102, as being anticipated, and of claims 2 and 4 under 35 U.S.C. § 103, as being obvious, over Pfeiffer (U.S. Patent No. 2,881,130) are respectfully traversed.

Pfeiffer discloses a method for coking of heavy petroleum residues; the feeds are described at col. 2, lines 14-21, for example. The coke reactor is operated in connection with a coke burner to provide heated coke recirculation. Pfeiffer discloses broad ranges for the coking reactor temperature, i.e., 850 to 1200°F (454 to 650°C), and the burner temperature, i.e., 1000 to 1500°F (537 to 815°C).

As noted in the Office Action, Pfeiffer discloses nothing about reducing gaseous sulfur emissions. It is alleged in the office action that Pfeiffer discloses the same method steps as the instant claims and would, thus, inherently achieve the sulfur emission reduction. Inherency in the patent law is generally defined as a phenomena which "necessarily and inevitably" occurs, as opposed to a phenomena which might occur, from a given set of conditions. Ex Parte Cyba, 155 USPQ 756 (Bd. App. 1966); and In re Oelrich, 212 USPQ 323, 326 (CCPA 1981). Applicants submit that Pfeiffer does not meet all the conditions of the instant claims and does not "necessarily and inevitably" result in reduced gaseous sulfur emissions. Pfeiffer does not disclose or suggest that the feeds used for its process contain significant amounts of sulfur which would cause gaseous sulfur emissions. Although it is not uncommon for heavy petroleum feeds to contain sulfur, it is not necessary and inevitable that they do. Pfeiffer certainly provides no indication that it contemplates that its feeds contain such sulfur compounds. Since the Pfeiffer feeds do not necessarily and inevitably contain sulfur, the Pfeiffer process does not necessarily and inevitably result in reduction of sulfur emissions. Thus, the instant claims are not anticipated. In this connection, the claims have been rewritten to make clear that the feed is a "heavy oil containing sulfur compounds" and that the "emission of gaseous sulfur compounds is significantly reduced." See also new claim 10, based on the example in the specification, quantifying the sulfur emission rate.

Pfeiffer also fails to suggest modification of its process to render the claimed invention obvious under 35 U.S.C. § 103. As discussed below, applicants have shown that their method

provides significant advantages in reduced sulfur emission. Such advantages could not have been expected from the Pfeiffer disclosure. As established, Pfeiffer discloses nothing at all regarding sulfur emission or its reduction. The unexpected advantages of the claimed invention further prove nonobviousness.

In order to make the distinction of the claimed invention more clear, the independent claim has been rewritten in Jepson form. The invention was made as a result of investigations of how to increase the throughput of the heavy oil for coking without exceeding set governmental limits for gaseous sulfur emissions. Despite the Pfeiffer disclosure, which is quite old art, the current conventional method for fluid coking of heavy oils with a coke burner and recirculation is carried out using a coke burner temperature of about 645°C (see the Background of the Invention in the instant specification and the Jepson preamble recitation in claim 5). This high temperature was desirable in the sense that the heat requirement for the coking reactor could be met with a smaller recirculation rate because the hot coke was at a higher temperature. What was unknown and what applicants discovered as a result of their investigations was that the higher temperature resulted in high sulfur gas emissions from the coke and that lower burner temperature could significantly lessen the sulfur emission while still maintaining a high volatile emission needed for fueling the burner; see, e.g., page 2, line 18, to page 3, line 19, and page 5, lines 4-11, of the instant specification. Because the lower burner temperature would result in a lower temperature of hot coke, the recirculation rate would have to be increased to meet the heat requirement of the coking reactor, but the very important sulfur emission per amount of throughput would be significantly reduced. Thus, a higher throughput could be achieved while still meeting the governmental emission requirements. This provides a distinct advance in the art.

While Pfeiffer recognizes that a lower burner temperature would require a higher recirculation rate, it does not recognize the significant advantage in sulfur emission reduction or the mechanisms underlying it discovered by applicants, as discussed above.

The instant specification provides a side-by-side experiment showing the advantage of the invention over the conventional process; see page 4, lines 4-13. It can be seen that the claimed invention, at the same throughput rate, results in a reduction of gaseous sulfur emissions from 230 to 180 tons/day, a significant advantage.

In addition to the above distinctions, certain dependent claims are further distinguished in that Pfeiffer fails to disclose or suggest a process using a bitumen feed or a process wherein the method results in an SO_2 discharge of about 180 tons per 110 kB of heavy oil throughput.

For the above reasons, it is urged that the claimed invention and the advantages thereof are not disclosed or rendered obvious by Pfeiffer and the rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103 should be withdrawn.

It is submitted that the claims are in condition for allowance. However, the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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